Fig. 4. *Chorilibinia gracilipes*, male individual: × 1½ diam. 4 *a*. Lateral view of carapace of the same, showing the disposition of the dorsal spines: × 1½ diam.
Fig. 5. *Paramithrax* (*Paramithrax*) *spinosus*, male individual: nat. size.
Fig. 6. *Pisa carinimana*, male individual, × 1½ diam. 6 *a*. Outer view of hand of the same: × 3 diam.
Fig. 7. *Hyastenus gracilirostris*, male individual: × 1½ diam.
Fig. 8. Lateral view of front of carapace and rostrum of *Pseudomicippe varians*, male individual: × 3 diam. 8 *a*. Lateral view of the same parts in a female individual, showing variation in the form and direction of the rostral spines: × 3 diam.
Fig. 9. *Micippe parvirostris*, female individual: nat. size.

PLATE V.

Fig. 1. Carapace of *Othonia quadridentata*: nat. size.
Fig. 2. *Parathoë rotundata*, male individual: × 2 diam. 2 *a*. Inferior view of frontal and antennal region of the same: × 4 diam.
Fig. 3. *Lambrus Holdsworthi*, female individual: nat. size.
Fig. 4. *Lambrus lævicarpus*, male individual: nat. size.
Fig. 5. *Lambrus deflexifrons*, male individual: nat. size. 5 *a*, Lateral view of front of the cephalothorax of the same, showing the deflexed rostrum: × 2 diam.
Fig. 6. Front of carapace and rostrum of *Lambrus hoplonotus*, var. *longioculis*: × 3 diam.
Fig. 7. Front of carapace and rostrum of *L. hoplonotus*, var. *planifrons*: × 2 diam.
Fig. 8. *Lambrus* (*Parthenopoides*) *erosus*, male individual: × 1½ diam.
Fig. 9. *Lambrus* (*Parthenopoides*) *expansus*, male individual: × 1½ diam.
Fig. 10. *Cryptopodia spatulifrons*, male individual: nat. size.
Fig. 11. *Ceratocarcinus spinosus*, female individual: × 2 diam. 11 *a*. Inferior view of antennal and orbital region of the same: further magnified. 11 *b*. Outer view of hand: further magnified.

II.—*Notes on the Palæozoic Bivalved Entomostraca.* No. XII. *Some Carboniferous Species belonging to the Genus* Carbonia, *Jones.*

By Professor T. RUPERT JONES, F.R.S., and JAMES W. KIRKBY, Esq.

[Plates II. & III.]

In previous papers on Carboniferous Entomostraca we have attempted to show, and critically examine, what has been already done in investigating this interesting though somewhat difficult group of fossils.

In a paper published in May 1865 *, we gave the result of an examination of a series of specimens from Bavaria,

* Ann. & Mag. Nat. Hist. ser. 3, vol. xv. p. 404.

illustrative of the species described by Count Münster in 1830 *.

In July 1866, in another paper †, we discussed what had been done by British authors, from the time of Ure (1793) to that of M'Coy (1844), our observations being based, in several instances, on an examination of type specimens.

In 1867 we gave, in the 'Transactions of the Geological Society of Glasgow,' a list and short account of the Entomostraca occurring in the Carboniferous rocks of Scotland ‡. The list included a great many new species (discovered by Mr. John Young and other Members of the above Society), most of which have yet to be described and figured.

In 1870 one of us described some species (*Carboniæ* &c.) from South Wales §.

Lastly, in 1875 ||, we noticed some Russian specimens presented to us by the late M. d'Eichwald, with a few from the late Sir R. I. Murchison's collection.

These papers, though slight, have helped to clear the way for the description of new species, by showing what others have done in this field of research, and what our opinion was of the results of their work, with a view to the rectification and unification of the synonymy, and to the determination of numerous species not yet described.

Among other materials which have accumulated in our many years' study of Carboniferous Entomostraca is a large suite of specimens belonging to a group of seven species, hitherto referred to *Cythere*, but which apparently belong to the genus *Carbonia*, established by one of us, in 1870, for the reception of two species from the Coal-measures of South Wales. It is proposed to give a brief account of the seven species in the present paper.

The species in question have the form of ordinary *Cytheræ*, but differ from them in possessing a circular muscle-spot near the centre of each valve, after the manner of *Leperditia*. The muscle-spot is commonly seen in casts as a slightly raised tubercle. When the interior of the carapace-valves is exposed (which is not often), the spot appears as a shallow excavation. In some of the ironstones of the west of Scot-

* Leonhard und Bronn's 'Jahrbuch für Mineralogie' &c. Jahrg. 1830, pp. 60–70.

† Ann. & Mag. Nat. Hist. ser. 3, vol. xviii. p. 32.

‡ Trans. Geol. Soc. Glasgow, vol. ii. p. 213.

§ Geol. Mag. vol. vii. p. 214.

|| Ann. & Mag. Nat. Hist. ser. 4, vol. xv. p. 52.

land, where the valves are of a bright black colour, the spot is white.

These *Carboniæ* are from:—(1) the Calciferous Sandstone or Lower Carboniferous series of Scotland; (2) the coal-bearing strata of the Carboniferous Limestone series of the same country; and (3) the Coal-measures of England, Wales, and Scotland. They occur in bituminous shales, in blackband and clayband ironstones, in parrot-coals, and in impure limestones. Individuals of some of the species, more particularly of *C. fabulina*, appear to have swarmed in the waters in which these deposits were formed. Some of the strata are literally full of their remains. They are essentially characteristic of the carbonaceous portions of the Carboniferous System. Wherever conditions suitable for the laying down of *Coal-measures* prevailed, there these Entomostraca flourished, almost to the exclusion of species of other genera.

It ought to be mentioned that we are greatly indebted, for multitudes of specimens from the west of Scotland, and for much information as to the distribution of the species, to Mr. John Young, of Glasgow, who is also the discoverer of several of the species here described. For other specimens we have to thank Mr. James Armstrong and Mr. James Thomson of Glasgow, Dr. Rankine of Carluke, Mr. Grossart of Shotts, Mr. E. W. Binney of Manchester, Mr. John Ward of Longton, and other friends. Our examination of the very numerous specimens collected by the Geological Surveyors of Scotland has greatly enlarged our knowledge of this genus.

Genus Carbonia, Jones (1870).

Valves (as known) subovate, ovate-oblong, or elongate; anterior third usually smaller than the posterior; the right valve slightly larger than the left, overlapping it sometimes along the middle portion of the ventral edge. Hinge-line in the middle third of dorsal margin, more or less defined between the anterior and posterior curved slopes of the dorsal margin. Hinge simple. Muscle-spot circular, enclosing three or four translucent spots or a lobed pattern; level or slightly depressed on the outside, somewhat hollow within. The valves are bent inwards, in some cases, near the muscle-spots, and leave slight, subcentral, transverse furrows on the cast.

The round and spotted muscle-mark, hollow within, is characteristic of this genus.

1. *Carbonia fabulina*, Jones and Kirkby.
(Pl. II. figs. 1–10.)

Cythere fabulina, J. & K. Trans. Geol. Soc. Glasgow, 1867, vol. ii. p. 217.
Cythere? fabulina, J. & K. Geol. Mag. 1870, vol. vii. p. 218.

1. *Typical examples*: length $\frac{1}{35}$, $\frac{1}{30}$, and $\frac{1}{20}$ inch.

More or less bean-shaped. Dorsal border arched, highest behind; anterior extremity more acutely rounded than the posterior; ventral border straight or slightly incurved about the middle, where the right valve overlaps the left. Height more than half the length, sometimes fully two thirds. Dorsal and ventral aspects acutely ovate, widest behind. Surface of most specimens smooth, but, in well-preserved valves, pitted or rudely reticulate. A circular muscle-spot, subcentrally placed, is indicated externally in some examples; but it is best seen in casts as a slightly raised spot or tubercle.

The above gives the characters of what may be taken as typical examples of the species. Other specimens show differences that appear of varietal value. The more important of these are:—

2. Var. *humilis*. (Pl. II. figs. 11–14.)

Elongate; dorsal border flatly convex; extremities rounded and more nearly alike than in type specimens; ventral border straight. Length $\frac{1}{30}$ to $\frac{1}{25}$ inch.

3. Var. *inflata*. (Pl. II. figs. 15–19.)

A thick-shelled, obese form, greater in width than in height, and with the greatest width nearer the posterior end than in other forms, which thus gives the dorsal and ventral aspects of the carapace a subcuneiform outline. Length $\frac{1}{30}$ inch.

4. Var. *subangulata*. (Pl. II. figs. 20–23, and 24?.)

A gibbous, robust variety, of great relative height, with a subangular dorsal border, and a very abrupt postero-dorsal slope. Length $\frac{1}{17}$ inch.

This variety is the largest of any of the forms of *C. fabulina*. We figure with it a specimen from Millburn, Campsie, which possesses a similar dorsal border, but less angulate, and of very different relative height (fig. 24). This may ultimately prove to belong to another variety.

C. fabulina has some resemblance to *Cythere cuneola*, J. &

K., of the marine beds of the Carboniferous Limestone series. The latter is usually smaller than ordinary examples of *Carbonia fabulina*; and its valves have not the same ventral overlap. Otherwise it is not always an easy matter to distinguish them.

Localities and Mode of Occurrence.—At Pittenweem, in the Calciferous Sandstone series, about 800 feet below the base of the Carboniferous Limestone, *C. fabulina* occurs in blackband ironstone, associated with *Carbonia Rankiniana*, J. & K., *Leperditia scotoburdigalensis* (Hibbert), coprolites (possibly of *Rhizodus*), and the remains of *Lepidodendron*.

At Millburn, Campsie, in the Carboniferous Limestone series, it is found in impure limestone, together with *Spirorbis carbonarius*, Murch., and Stigmarian rootlets.

In the same formation at Crossgatehall, near Edinburgh, it is met with in ironstone, with *C. Rankiniana*, *C. pungens*, *Spirorbis* sp., and *Lingula squamiformis*, Phill.

In the Coal-measures at Provanhall, Lanarkshire, it is found in black carbonaceous shale, with fish-remains and plants.

Also in the same formation at Pirnie Colliery, Fifeshire, in parrot-coal, with *Carbonia Rankiniana*, and associated with the remains of the Amphibian *Loxomma Allmani*, Huxley, and Fish, such as *Strepsodus sauroides*, Ag., *Megalichthys Hibberti*, Ag., *Cœlacanthus lepturus*, Ag., *Ctenodus* sp., *Pleuracanthus gibbosus*, Ag., and others; also *Anthracomya pumila*?, Salter, *Spirorbis carbonarius*, Murch. (attached in numbers to drifted fragments of *Sigillaria*), and species of *Antholites*, *Lepidodendron*, *Calamites*, and *Stigmaria*.

At the same locality, on another horizon, the variety *inflata* occurs in coarse ironstone, which is filled with fragments of Calamites, the Entomostraca being found within the filled-up stems of the plants as well as in the matrix. A similar fact was observed by Mr. John Young, who obtained a number of examples of this species from the stem of a *Lepidodendron*, at Possil, near Glasgow *.

Near Hylton, west of Sunderland, it is met with high in the Durham Coal-field, in a clayband ironstone, associated with great numbers of an *Estheria*-like fossil, *Ancylus*? *Vinti*, Kirkby, *Carbonia Rankiniana*, J. & K., *Beyrichia arcuata* (Bean), a species of *Anthracomya*, Plant-remains, and the wings of Orthopterous Insects.

Other localities we give, with less detail, as follows :—

* 'List of Carbon. Fossils of West of Scotland,' by John Young and James Armstrong, p. 27.

Coal-measures:

Longton, Staffordshire, in black shale, from Mr. J. Ward.

Blakemoor, Wyre Forest, Shropshire, in ironstone, with Fish-remains and *Spirorbis carbonarius*.

Bradford, near Manchester, in black shale.

Ryhope Colliery, near Sunderland, in black shale and ironstone, with *Carbonia scalpellus*, *Anthracosia* sp., *Lingula Credneri*, Geinitz (rare), the remains of Ganoid Fishes, and Plants.

Wooley Colliery, Durham, in black shale, with *Anthracosia* sp., *Spirorbis carbonarius*, and *Calamites*.

Cramlington Colliery, Northumberland, in black shale, with *Anthracosia acuta*, Sow., *Spirorbis carbonarius*, and Plants.

Prestwick Colliery, Northumberland, in black shale, with *Anthracosia* and Fish-remains.

Coast south of Newbiggen, Northumberland, in black shale.

Coast near Blyth, Northumberland, in black shale and ironstone.

Shotts Iron-works, Lanarkshire, in clayband ironstone.

Whifflet, near Glasgow, in ironstone.

Kiltongue, near Glasgow, in blackband ironstone.

Carluke, Lanarkshire, in "Musselband" ironstone, and on other horizons.

Ardrie, Lanarkshire, in blackband ironstone.

River Leven, near Kirkland Dam, Fife, in black shale with macrospores.

Scoonie, Fife, in ironstone from the roof of "8-foot coal," with *Anthracosia acuta* (Sow.) and *A. aquilina* (Sow.).

Muiredge Colliery, Fife, in dark-grey shale, with *Anthracosia acuta*, *A. aquilina*, *Anthracoptera carinata* (Sow.), and *A. modiolaris* (Sow.).

Methil, Fife, in blackband ironstone, with *Carbonia Rankiniana*, *C. pungens*, *Leaia Leidyi* (Lea), *Spirorbis carbonarius*, *Anthracomya* sp., Ganoid scales and bones, and Stigmarian rootlets.

Carboniferous Limestone series:

Rae's Gill, Carluke, in ironstone.

Possil, north of Glasgow, in blackband ironstone, with *Carbonia Rankiniana*, *Anthracoptera* sp., *Rhizodus Hibberti*, Ag., *Megalichthys*, *Palæoniscus*, *Lepidodendron*, and *Stigmaria*.

Craigenglen, Campsie, Lanarkshire, in "white limestone," with *Carbonia pungens*, *Rhizodus Hibberti*, and Stigmarian roots and rootlets.

Fife coast, near Pathhead, in ironstone.

Lochgelley Colliery, Fife, in blackband, with *Spirorbis* sp., *Lepidostrobus*, and other plant-remains.

On the Fife coast, near Kilrenny Mill, Anstruther, in ironstone, about 3500 feet below the Carboniferous Limestone, associated with *Carbonia Rankiniana*, *Leperditia scotoburdigalensis*, a thin-shelled *Myalina*, and Ganoid scales.

The Binn Quarry, Burntisland, Fife, in shale, associated with *Carbonia subula*, *Littorina scotoburdigalensis*, Etheridge, and *Spirorbis* sp.

2. *Carbonia Rankiniana*, Jones and Kirkby. (Pl. III. figs. 1–8.)

Cythere Rankiniana, J. & K. Trans. Geol. Soc. Glasgow, 1867, vol. ii. p. 217.

Elongate, convex (usually), with the greatest height and width at the posterior third; height less than half the length. Dorsal border sloping flatly from the posterior third towards the anterior extremity, which is rounded; ventral border straight or slightly incurved; posterior extremity rounded, with an abrupt dorsal slope. Right valve rather the largest, overlapping the left along the middle of the ventral edge. Muscle-spot round or somewhat oval. A transverse furrow is often shown on casts near the centre of each valve, indicating a local contraction or partial thickening of the shell at this spot. Surface usually smooth; but in some specimens a reticulation is discernible. Length $\frac{1}{20}$ to $\frac{1}{18}$ inch.

The muscle-spot is rarely seen in this species; but the transverse furrow (fig. 6) is often present in casts. This feature also characterizes *C. subula*; and it has been noticed by one of us in *C. Agnes* from the South-Wales coal-field.

This species ranges through the same portions of the Carboniferous series as *C. fabulina*; but, though widely distributed, it is less abundant than that species.

Localities and Mode of Occurrence.—Coal-measures:

Blakemoor, Wyre Forest, in ironstone, with fossils as before.

Hylton, W. of Sunderland, in ironstone.

Shotts Iron-works, Lanarkshire, in ironstone and parrot-coal.

Ardrie, Lanarkshire, in blackband ironstone.

Carluke, Lanarkshire, in ironstone, with *Spirorbis carbonarius*.

Whifflet, near Glasgow, in ironstone.

Provanhall, near Glasgow, in carbonaceous shale, with fossils as before.

Pirnie Colliery, Fife, in parrot-coal, with fossils as before.

Methil, Fife, in blackband ironstone, with fossils as before.
Methil, Fife, in soft hematite, with Ganoid scales.

Carboniferous Limestone series :

Rae's Gill, Carluke, Lanarkshire, in clayband ironstone.
Crossgatehall, near Edinburgh, with fossils as before.

Calciferous Sandstone series :

Fife coast, west of Pittenweem, in blackband ironstone, 800 feet below the base of the Carboniferous Limestone, with fossils as before.
Fife coast, near Billow Ness, in dark shale, 2950 feet below the base of the Carboniferous Limestone, with *Rhizodus* scales, *Spirorbis* sp., *Cyclopteris? flabellata*, Brong., and *Lepidophyllum*.
Fife coast, near Kilrenny Mill, Anstruther, in ironstone, about 3500 feet below the Carboniferous Limestone, with *Carbonia fabulina* &c. as above.
A form very similar to, if not identical with *C. Rankiniana* occurs in the Yellow Sandstone of Cultra, Holywood, Ireland, low down in the Carboniferous series (see Ann. & Mag. Nat. Hist. ser. 3, vol. xviii. p. 49).

3. *Carbonia subula*, Jones and Kirkby.
(Pl. III. figs. 9–13.)

Cythere subula, J. & K. Trans. Geol. Soc. of Glasgow, 1867, vol. ii. p. 222.

Very elongate, subcylindrical. Dorsal border slightly convex; with an easy slope to the anterior extremity, which is relatively broad, and projectiug above; and with a more abrupt and deeper slope to the posterior extremity, which is rounded or, in some examples, bluntly pointed; ventral border straight or very slightly concave where the right valve seems to show a small overlap of the left. Dorsal and ventral aspects lenticular. Surface smooth, so far as known. Length ($\frac{1}{25}$ inch) nearly four times the height.

C. subula has the greatest length compared with height of all the *Carboniæ*. We, in a measure, assume that it belongs to this genus, not having seen specimens with the muscle-spot *, though casts showing the transverse furrow, as noticed in *C. Rankiniana* and *C. Agnes*, have repeatedly occurred to us. Moreover the general habit of the carapace is the same as in the species previously described.

It is found in the Calciferous Sandstone and Carboniferous Limestone series. It has not been seen in the Coal-measures.

* Mr. John Young informs us that he has seen what he considers to be the muscle-spot of this species.

Localities and Mode of Occurrence.—Carboniferous Limestone series :

Crossgatehall, near Edinburgh, in ironstone nodules, with *Carbonia Rankiniana*, *pungens*, and *fabulina*, *Spirorbis* sp., and *Lingula squamiformis*.

Craigenglen, Campsie, Lanarkshire, in impure limestone, with *C. Rankiniana*, *pungens*, *secans*, and *fabulina*, and remains of *Megalichthys*, *Palæoniscus*, *Eurynotus*, *Spirorbis carbonarius*, and *Lepidodendron*.

Calciferous Sandstone series :

Coast of Fife, near Pittenweem, in shale, 2350 feet below the base of the Carboniferous Limestone, associated with *Leperditia scotoburdigalensis*, Fish-remains, and Plants.

Coast of Fife, east of Pittenweem, in dark tough shale and ironstone, 2460 feet below the base of the Carboniferous Limestone, with an Aviculoid shell.

Coast of Fife, near Billow Ness, in grey shale, 3200 feet below the base of the Carboniferous Limestone, with many individuals of *Myalina modioliformis*?, Brown, some remains of Fishes, *Beyrichia subarcuata*, Jones, and *Leperditia* sp.

Coast of Fife, Anstruther, in shale and ironstone, 3600 feet below the base of the Carboniferous Limestone, with *Leperditia scotoburdigalensis* and a thin-shelled *Myalina*.

Coast of Fife, near Randerstone, in shale and ironstone, with *Myalina modioliformis*? and *Leperditia scotoburdigalensis*.

Binn Quarry, Burntisland, Fife, in shale, with *Carbonia fabulina* &c. as above.

4. *Carbonia scalpellus*, n. sp. (Pl. III. figs. 14–17.)

Elongate and somewhat compressed. Dorsal and ventral margins nearly parallel, the latter, however, being slightly concave near the middle; the posterior extremity blunt and subtruncate; the anterior extremity more produced and rounded. Dorsal and ventral aspects flatly lenticular, with the posterior end rather obtuse. Muscle-spot circular, rather large, and placed a little towards the anterior end. Surface smooth (?). Length $\frac{1}{14}$ inch.

This species is easily distinguished from *C. subula* by the difference in outline, greater height, and less relative width of the carapace.

It has been found only in the Coal-measures, at Ryhope Colliery, near Sunderland, where it occurs in black shale and ironstone, 592 feet below the base of the overlying Permian deposits. The associated fossils are *Carbonia fabulina*, the remains of Ganoid Fishes, *Anthracosia* sp., *Lingula Credneri* (rare), *Sigillaria*, *Lepidodendron*, and *Calamites*.

5. *Carbonia secans*, Jones and Kirkby. (Pl. III. figs. 18–20.)

Cythere secans, J. & K. Trans. Geol. Soc. of Glasgow, 1867, vol. ii. p. 222.

Mytiloid, compressed. Dorsal border arched, highest behind, sloping rapidly in front to the anterior extremity, which is pointed; posterior extremity rounded; ventral margin slightly concave, with a small overlap of the right valve. Dorsal and ventral aspects compressed; the width is less than one fourth of the length; the height less than half the length. Surface smooth. Length $\frac{1}{32}$ inch.

This species is of comparatively rare occurrence.

Localities and Mode of Occurrence.—Coal-measures:

Blakemoor, Wyre Forest, in ironstone, with *C. fabulina* &c.

Hylton, west of Sunderland, in ironstone, with *C. Rankiniana* &c.

Carboniferous Limestone series:

Craigenglen, Campsie, Lanarkshire, in impure limestone with *C. fabulina*.

6. *Carbonia pungens*, Jones & Kirkby. (Pl. III. figs. 21–23.)

Cythere pungens, J. & K. Trans. Geol. Soc. of Glasgow, 1867, vol. ii. p. 222.

A small subcylindrical *Carbonia*, pointed at the anterior end. Dorsal border flatly convex, highest behind, sloping gently in front to a pointed anterior extremity; ventral border straight; posterior extremity bluntly rounded. Height considerably less than half the length. Dorsal and ventral aspects cuneiform, being nearly as wide as high behind, and acutely pointed in front. Muscle-spot situate rather anterior to centre of valve. Surface smooth, so far as known. Length $\frac{1}{36}$ inch.

This species is the smallest of the series here described; and though somewhat resembling *C. secans*, it can be distinguished by its general outline being less Mytiloid, and by its wedge-shaped dorsal and ventral aspects.

It is not a rare form in Scotch Carboniferous strata, but is, as yet, of unknown occurrence in England.

Localities and Mode of Occurrence.—Coal-measures:

Provanhall, near Glasgow, in black shale, with fossils as before.

Carluke, Lanarkshire, in ironstone, with fossils as before.

Pirnie Colliery, Leven, Fife, in parrot-coal, with fossils as before.
Methil, Fife, in blackband ironstone, with fossils as before.
Carboniferous Limestone series:
Craigenglen, Campsie, Lanarkshire, in impure limestone, with *C. fabulina* and other fossils as before.
Crossgatehall, near Edinburgh, in ironstone nodules, with fossils as before.

7. *Cythere*? (*Carbonia*?) *bairdioides*, n. sp. (Pl. III. figs. 24, 25; 26 and 27?.)

We have specimens of a form from Pirnie Colliery, Fife, and Craigenglen, Campsie, which may ultimately prove to belong to *Carbonia*. Only few examples of it, however, have occurred, and its muscle-spot has not been seen; so that for the present we figure and notice it as a *Cythere*, with doubt. Length $\frac{1}{17}$ inch.

It simulates a *Bairdia* in outline, having a regularly arched dorsal border, with one end rather pointed, the other rounded, and a very slightly convex ventral border.

The Fifeshire specimens are much the largest, being $\frac{1}{17}$ inch in length. A similar form, given to us by Mr. John Ward, occurs in the Upper Coal-measures at Longton, Staffordshire.

We have given particulars of the mode of occurrence and associated fossils of the Entomostraca which we have just described, with some detail, as such facts bear on the question of the physical conditions under which they existed. It will have been seen that the fossils usually found with most of the species are the remains of Fishes, Amphibia (in a few instances), *Anthracosia* and shells of that family, the ubiquitous *Spirorbis carbonarius*, and Plants (Ferns excepted). These are, of course, the common fossils of the Palæozoic coal-bearing strata; and about their natural habitats we do not know much after all. In two localities species of *Lingula* * are associated with them. In another (where *Carbonia fabulina* attains its largest development) *Leperditia scotoburdigalensis* is abundant; and this *Leperditia* in other localities has sometimes marine companions. One species, *Carbonia subula*, is commonly accompanied by *Myalina modioliformis*?, Brown, which is a very common fossil in the lower portion of the Calciferous Sandstone series, and repeatedly occurs with marine fossils, such as species of *Axinus*, *Aviculopecten*,

* In the Trias of Germany *Lingula* is associated with *Estheriæ* of brackish-water habitat. See 'Monogr. Fossil *Estheriæ*,' Pal. Soc. 1863, pp. 48, 49.

Murchisonia, *Bellerophon*, and *Orthoceras*. Thus in some few instances we find *Carboniæ* associated with fossils that are either estuarine or marine, or have decided marine affinities. In the majority of cases they are found with fossils whose natural habitats we do not know. This is the substance of our present knowledge on the question of the physical conditions belonging to deposits containing the above-described species.

The following list may be of use in showing what Entomostraca occur in the British Coal-measures besides six of the seven described in this paper.

List of Bivalved Entomostraca described from the Coal-measures of Great Britain, with References to Figures of the Species.

1. Cypridina radiata, *J., K., & B.*, Monograph of Brit. Carb. Entomostraca, part i. 1874, p. 14, pl. v. fig. 6.
2. Beyrichia arcuata (*Bean*), Ann. & Mag. Nat. Hist. 1836, vol. ix. woodcut 55, at p. 377.
3. —— subarcuata, *Jones*, Monogr. Foss. Estheriæ, 1863, p. 120, pl. v. figs. 16, 17.
4. Leperditia inflata (*Murchison*), "Siluria," 4th (3rd) edit. 1867, woodcut 83, p. 301.
5. Candona? Salteriana, *Jones*, Monogr. Foss. Esth. 1863, p. 122, pl. v. figs. 13, 14.
6. Cythere? bairdioides, *J. & K.*, figured in present paper.
7. Carbonia Evelinæ, *Jones*, Geol. Mag. vol. vii. 1870, p. 218, pl. ix. fig. 4.
8. —— Agnes, *Jones*, Geol. Mag. vol. vii. 1870, p. 218, pl. ix. figs. 6–10.
9. —— ? sp., *Jones*, Geol. Mag. vol. vii. 1870, p. 218, pl. ix. fig. 5.
10. —— fabulina, *J. & K.*, figured in present paper.
11. —— Rankiniana, *J. & K.*, figured in present paper.
12. —— scalpellus, *J. & K.*, figured in present paper.
13. —— secans, *J. & K.*, figured in present paper.
14. —— pungens, *J. & K.*, figured in present paper.
15. Estheria Adamsii, *Jones*, Geol. Mag. vol. vii. 1870, p. 217, pl. ix. figs. 1, 2.
16. —— striata (*Münster*), and vars., Monogr. Foss. Estheriæ, 1863, p. 23, pl. i. figs. 8–18.
17. —— tenella (*Jordan*), Monogr. Foss. Estheriæ, p. 31, pl. i. figs. 26, 27, &c.
18. Leaia Leidyi (*Lea*), and var. Williamsoniana, *Jones*, Monogr. Foss. Estheriæ, p. 115, pl. i. figs. 19, 20, pl. v. figs. 11, 12; and Geol. Mag. vol. vii. p. 219, pl. ix. figs. 11–14.

EXPLANATION OF THE PLATES.

Plate II.

All the figures magnified 25 diameters, except 9 and 10, which are more highly magnified.

Fig. 1. *Carbonia fabulina*: left valve. Millburn, Campsie.
Fig. 2. The same: right valve, showing muscular spot. Craigenglen.

Fig. 3. The same: cast of right valve, showing muscle-spot. Millburn, Campsie. *Fig.* 4. Dorsal view. *Fig.* 5. Ventral view.
Fig. 6. The same: right valve. Ryhope Colliery, Sunderland.
Fig. 7. The same: right valve. Millburn, Campsie. *Fig.* 8. End view.
Fig. 9. The same: portion of surface of specimen from Provanhall. × 75 diam.
Fig. 10. The same: portion of surface of specimen from Whifflet. × 75 diam.
Fig. 11. *Carbonia fabulina*, var. *humilis*: left valve. Craigenglen.
Fig. 12. The same: right (?) valve. Craigenglen. *Fig.* 13. Dorsal outline.
Fig. 14. The same: left valve, showing muscle-spot. Pirnie Colliery, Leven, Fife.
Fig. 15. *Carbonia fabulina*, var. *inflata*: left valve and part of the edge of right valve. Pirnie Colliery. *Fig.* 16. Ventral view. *Fig.* 17. End outline.
Fig. 18. The same: cast of right valve, showing muscle-spot. Craigenglen. *Fig.* 19. Dorsal outline.
Fig. 20. *Carbonia fabulina*, var. *subangulata*: left valve. West of Pittenweem.
Fig. 21. The same: cast of right valve, showing muscle-spot. West of Pittenweem. *Fig.* 22. Ventral outline. *Fig.* 23. End outline.
Fig. 24. *Carbonia fabulina*, var. *subangulata* (?): right valve. Millburn, Campsie.

Plate III.

All the figures magnified 25 diameters, except fig. 8, which is more highly magnified.

Fig. 1. *Carbonia Rankiniana*: left valve. West of Pittenweem.
Fig. 2. The same: right valve. Provanhall. *Fig.* 3. Dorsal outline. *Fig.* 4. Ventral outline. *Fig.* 5. End outline.
Fig. 6. The same: cast of right valve, showing transverse furrow. West of Pittenweem.
Fig. 7. The same: cast of right valve, showing muscle-spot and slight furrow. West of Pittenweem.
Fig. 8. The same: portion of surface. Provanhall. ×75 diam.
Fig. 9. *Carbonia subula*: left valve. Crossgatehall, near Edinburgh.
Fig. 10. The same: right valve. Gilmerton. *Fig.* 11. Ventral outline. *Fig.* 12. Dorsal outline. *Fig.* 13. End outline.
Fig. 14. *Carbonia scalpellus*: cast of left valve, showing muscle-spot. Ryhope Colliery.
Fig. 15. The same: right valve, showing muscle-spot. Ryhope Colliery. *Fig.* 16. Ventral outline. *Fig.* 17. End outline.
Fig. 18. *Carbonia secans*: right valve. Craigenglen.
Fig. 19. The same: left valve. Craigenglen. *Fig.* 20. Dorsal outline.
Fig. 21. *Carbonia pungens*: cast of left valve, showing the muscle-spot. Methil.
Fig. 22. The same: right valve. Craigenglen. *Fig.* 23. Dorsal outline.
Fig. 24. *Cythere* (?) *bairdioides*: right valve. Pirnie Colliery. *Fig.* 25. Dorsal outline of single valve.
Fig. 26. *Cythere*? near *C.*? *bairdioides*: right valve. Craigenglen. *Fig.* 27. Dorsal outline.